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ABSTRACT

This paper presents an overview of a project concerned with the design and development of a comprehensive career education curriculum with sufficient detail and flexibility to be used in the majority of elementary and junior high schools throughout the nation. The principal products to be developed include a catalog of instructional objectives, a series of curriculum guides, and a series of sample teaching-learning units. Other products will be an instructional systems model, a dissemination model, a local evaluation instrument, and various training materials and project reports. To date, the scope of the project and the domain of behavioral objectives for the program have been defined. The economic constraint in the implementation of career education is commented on. Charts developed to reflect the curriculum topics and content coverage are appended. (MF)

ED 072259

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THE AIR CAREER EDUCATION CURRICULUM DEVELOPMENT PROJECT

James A. Dunn
American Institutes for Research

Paper presented at the USOE BAVTE Curriculum Center for Occupational and Adult Education Conference in connection with the American Vocational Association Convention, Chicago, Illinois, December 4, 1972.

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PROJECT OVERVIEW

Goals and Purposes. The AIR CEC Project differs somewhat from many earlier projects in career education. Whereas many of the earlier efforts were directed toward ascertaining the feasibility of career education, the development of experimental career education materials and procedures, and the conduct of exemplary demonstration programs, the AIR project is, by definition, a curriculum development project. We are concerned primarily with the design and development of a comprehensive career education curriculum that will be sufficiently detailed, yet flexible enough, that it can be used easily in the majority of typical elementary and junior high school classrooms without special administrative accommodations.

Specifically, we are charged with the development of a curriculum that would be "applicable to any school with grades functionally equivalent to the elementary and junior high school grades." This project represents a clear intent on the part of some groups in OE to move the state of career education beyond the boundaries of federally funded emperimental-demonstration projects and squarely into the mainstream of ongoing public school practice, i.e., to make career education a practical reality potentially available to all students, rather than simply an experimental innovation dependent on high levels of external funding.

For career education to be applicable to the majority of American elementary and junior high school classrooms, without exceptional administrative or fiscal accommodations, the curriculum must be, above all, realistic. That is, the curriculum, and the requisite instructional materials necessary to implement that curriculum, must be:

1) Economically feasible, i.e., the cost of implementation must be in the realm of economic possibility for typical school systems. It must fit within the confines of normal school expenditures for textbooks, workbooks, routine instructional material, and classroom operation costs;

2) Predicated on regular classroom staffing patterns. Long-term inservice teaching training, extensive use of teacher aides or paraprofessionals, or the use of new categories of technical specialists is neither characteristic of most public education, nor likely to be characteristic in the immediately foreseeable future;

3) Contained within the current allocation of teacher time and effort. It cannot be expected to either extend the school day, or to supplant curriculum commitments already extant;

4) Amenable to local needs, interests, and options; and

5) Readily available in quantity throughout the United States.

The specific objectives of the AIR CEC Project, then, as outlined in the request for proposal on which this project was based, are to:

1) "Develop, evaluate, and disseminate career education curriculum guides that are applicable to any school with grade levels functionally equivalent to elementary and middle or junior high schools' grades K-9 and which result in:

   a) the integration or continued integration of positive values and attitudes toward work;

   b) self-awareness;

   c) the development of decision-making skills; and

   d) awareness of orientation to and beginning exploration of occupational opportunities and career lines within major occupational fields.

2) Develop, implement, evaluate, and disseminate sample TLU's for the K-9 curriculum which fuse and/or coordinate academic and occupational concepts and which are multi-media.

3) Develop, evaluate, and disseminate a career education instructional system design which is adaptable to any elementary and middle or junior high school instructional program and which may serve as an alternative to present career education instructional systems."

Organizational Structure and Schedule of Activities. This project is being carried out by a nonprofit educational research group, six public school systems, and two county school systems, representing a total of approximately 155,000 pupil population. Members of this Curriculum Development Consortium are:

American Institutes for Research

Santa Clara Unified School System

Santa Cruz City Schools

Santa Cruz County Office of Education
Pajaro Valley Unified School District
San Lorenzo Unified School District
Soquel Union School District
Fresno County Unified School District
Live Oak Unified School District.

At the present time, project staff consists of eighteen persons, approximately half of whom come from the cooperating school districts. Roughly one-third of the current level of effort on the project derives from local support provided by AIR and the cooperating school districts independent of that provided by federal funds.

The project is divided into four phases. Phase I is the planning and design phase which is scheduled to last approximately seven months. During this period the rough scope and sequence of the curriculum will be designed, a general survey of relevant literature and instructional materials will be made, and initial strategies for evaluation, dissemination, and implementation will be identified

Phase II is the developmental phase. This period will last approximately ten months during which time sample teaching-learning units and prototype teacher training materials are to be developed.

Phase III is the field test and revision phase which will last approximately six months.

Phase IV will be the final phase of the project. It will be the dissemination phase, during which time the final report will be completed and the distribution of products will be made.

The schedule for accomplishment of major tasks within activity areas, and their coordinate points of review, are summarized in Figure 1.

Products. The major products to be developed by this project are:

1) A review of selected literature and materials appropriate for use in implementing the project curriculum.

2) A catalog of instructional objectives for a comprehensive K-9 career education program. This catalog will contain the general organizational structure of the curriculum as a whole plus approximately 2,000 instructional objectives appropriate for teacher use in the classroom. At the elementary school level, the vast majority of objectives will deal with student knowledge of self, and orientation to, and knowledge of, the world of work. At the junior high school level, the bulk of the objectives will deal with decision-making, planning skills, and exploration of options and opportunities.

3) A series of curriculum guides, one each for grades K-9 covering career education information as it is infused into mathematics, science, language arts, and social studies. These curriculum guides will contain:

   a) an overview of the philosophy of education underlying career education;

   b) a rationale for the behavioral objectives approach to curriculum development;

   c) a summary of the principles of applied learning theory appropriate for the development of learning units;

   d) a summary overview of the entire K-9 career education curriculum so the teacher can develop a perspective for the contribution of her class level to the total K-9 curriculum;

   e) a section on the theory of assessment, methods, and techniques for assessment for both criterion-referenced and group-referenced approaches;

   f) the specific behavioral objectives hierarchically arranged and integrated with the regular subject matter content of mathematics, science, social studies, and language arts;

   g) a section dealing with ways these objectives can be appropriately integrated into instructional modules so as to maximize the infusion of career education information into the subject matter areas and the integration of the content across subject matter areas wherever appropriate; and finally

   h) a section dealing with a summary of instructional resources, materials, and references appropriate for the teacher to use in the development of instructional modules.

   The guides will also contain an appendix which deals with the problems of the coordination of materials development, materials production, and materials implementation in the classroom. This appendix will be seen as having maximum value to those individuals or groups, be they teachers, school districts, or commercial product developers, who are concerned with the production of instructional modules and criterion tests on a relatively large scale. It is hoped that by the inclusion of this section considerable advice and recommendation may be made which will help those interested in the more ambitious development of fairly comprehensive sets of instruction units to avoid some of the

difficulties encountered when large numbers of materials are developed piecemeal.

4) A series of sample teaching-learning units of the type that teachers might develop for local classroom use in the implementation of the curriculum.

The purpose of these modules will be to illustrate alternative ways teachers might implement the curriculum. These modules will be produced so as to show the accommodation of different types of classroom conditions. In particular, they will vary on their urban/rural emphasis, upon student differences in age, sex, ethnic background, interests, abilities, and learning style, and upon the amount of multi-media support and instructional materials support available to the teacher.

These, then, are the key production elements of this project. Other products, however, are: an instructional systems model whereby the curriculum might be implemented; a dissemination, implementation, and utilization model by which the curriculum might be exported; an evaluation design and instrumentation that can be used to evaluate local implementation of the curriculum; administrator and teacher training materials; miscellaneous reports; newsletters and technical papers; periodic progress reports; and the project final report.

PROJECT STATUS

At this point let me describe briefly where we are with regard to curriculum development. Our primary effort to date has been to conceptualize the idealized scope and sequence of a comprehensive career education curriculum for grades K-9 and then to specify the domain of behavioral objectives necessary to implement that program.

Our first step was to conduct a fairly broad literature review to identify the general state of the art.

Early on we were impressed by the fact that career education appears to represent a confluence of two main streams of educational endeavor which had been relatively disparate until a few years ago. One was the mainstream of

curriculum reform, having its origin in the philosophy of Dewey and emphasizing functional practicality in the curriculum and active project learning on the part of the student. This tradition moved through the progressive education effort of the 1920's and 1930's, and saw the emergence of Tyler's instructional objectives concepts in programmed instruction and curriculum development in the 1950's and 1960's.

The other was the vocational education movement that focused on skills acquisition, long-range planning, and career development. The early vocational guidance concepts of Frank Parsons, a contemporary of Dewey, are still central in much career education planning. The major elaboration on the early Parsonian model was made by Ginzberg and associates when they emphasized that career development was a gradual process effected through a series of decisions over a period of years.

With this recognition of career education's dual heritage, we felt quite free to look for help in curriculum development from both sources. We were particularly helped in our early conceptualization by two major projects; one stemming from each of these two traditions. One followed in the Marland tradition of Winnetka and Pittsburg and was an attempt at curriculum and instructional methods reform through commitment to individualized instruction and the infusion of a strong career education component in grades K-12. This was Project PLAN. The other was a Quincy, Massachusetts project, Project ABLE, which was, in some respects, a mirror image to PLAN and was an attempt to infuse basic academic content into vocational training programs. Both of these were fairly large-scale developmental programs which were successful enough that they have survived, and continued to thrive, even after developmental funding was terminated.

In brief, both projects started with expressed goals, analyzed these goals in terms of the requisite knowledge and skills required to achieve those goals, broke that knowledge and skill into the subordinate concepts and competencies required for the achievement of that knowledge and skill, and then developed instructional objectives, the mastery of which would lead to the attainment of that knowledge and skill. This type of substantive analysis is reflected in the CEC Project Curriculum Topic Chart, Figure 2.

This is a conceptual schematic only and should not be assumed to have metric properties, that is, it should not be assumed that each of the component units will receive equal emphasis, indeed, Unit E is a core unit and will comprise perhaps 50% of the entire program when it is completed.

The next step after specification of general curriculum topics was to develop preliminary Strand Concept Charts. Examples of these charts are found in Figures 3 through 7. These charts take the curriculum strands from Figure 2, break them down into their subordinate concepts, and sequence those concepts across the ten years comprising the student's elementary school and junior high school program. These charts represent only the first cut of what would be theoretically desirable. At this point only modest attention is given to the practicality of the desired scope and sequence. It is not known whether too much is being expected of the learner too soon, whether there is an imbalance in the relative emphasis different parts of the curriculum are receiving, whether there is inappropriate timing in the introduction of requisite concepts in adjacent strands, etc. Thus, the third step is to focus on the relative emphasis to be placed on the various curriculum strands at various time periods. Figure 8 is a first step in this direction.

The Relative Content Coverage Chart, Figure 8, represents an initial effort at the quantification of curriculum interests. Each strand depicts relative amounts of emphasis by grade level for each of the curriculum strands. This chart represents ordinal scaling within strands only, not across strands. After we have a reasonable fix on the scope of objectives subsumed within each curriculum strand, we will then introduce orthogonal scaling across strands so that we can get a fairly accurate fix on a reasonably practical scope and sequence. The steps involved in the creation of a curriculum of this order of magnitude are decidedly different from those followed for more modest sized projects and programs. But the methodology is relatively explicit and spelled out very nicely, and in some detail, in the various sections on curriculum development in Crowell-Collier's new Encyclopedia of Education, (1971), especially in the article by Robinson.

In brief, to date we have generated approximately 1,500 behavioral objectives, or 70-80% of the anticipated total for the curriculum. We are

now at the stage where we are partitioning these objectives for various grade levels, and in the next few weeks we'll be adjudicating relative emphasis across strands. From this smoothing operation we will then be able to develop second order scope and sequence charts which are sequenced not only from the point of view of conceptual structure, but also from the point of view of the practical reality of time availability and learner capability. At that point we will have a tentative curriculum matrix which can then serve as a point of departure from the preliminary tryout by teachers in classrooms after the Christmas holidays preparatory to fine tuning of the curriculum matrix and insertion of the concepts under respective subject matter areas.

THE ECONOMIC CONSTRAINT

In conclusion, it might be appropriate to comment briefly on considerations that need to be given to one of the reality constraints mentioned earlier, namely, the economic constraint. In order for career education to be implemented widely throughout classrooms in the United States, it must be adaptable to current market conditions prevailing in education.

There are 275 textbook publishers in the United States competing for $500 million of school textbook and instructional materials monies. While this may seem like a lot, one need only consider that this amount represents less than that spent on advertising for women's cosmetics, and less than 1/50th of that spent for alcohol and whiskey annually in the United States. Indeed, the average annual expenditure for instructional materials of all sorts for use in the elementary schools in the United States in 1971 was, $8.12. Of this $8.12, less than 60¢ per child was spent on instructional materials for subject matter areas other than the big four: mathematics, science, language arts, and social studies. This is an average of only $16 per classroom (assuming 28 pupils per classroom) for instructional materials in all other such subject areas as art, music, drama, foreign language, physical education, and the like. The following table summarizes the breakdown of expenditure by subject matter areas.

TABLE A

1971 SCHOOL EXPENDITURES FOR INSTRUCTION MATERIALS*

Area	Per Cent	Per Pupil	Per Classroom**
Language Arts	58%	$4.71	$132
Mathematics	19	1.54	43
Social Studies	9	.73	20
Science	8	.65	18
Other	7	.57	16
Total		$8.11	$227

* Totals vary due to rounding error

** Assuming 28 pupils per classroom total

This rate of expenditure constitutes less than 1% of the total annual expense for education, and has remained essentially unchanged for the last 15 years.

Thus, it would seem that the practical reality is that, if career education is to be implemented in the public school classrooms, it is going to have to be implemented on a budget of perhaps no more than 10 to 15 to 20 dollars per classroom per year for instructional materials. This is a sobering thought, but nevertheless, I think, a real one. And even then it is assuming major fiscal reallocations of 5% to 10% within existing materials budget categories.

This, then, is one of the problems we face, and one which we must meet squarely if we are to achieve our goal.

Figure 1

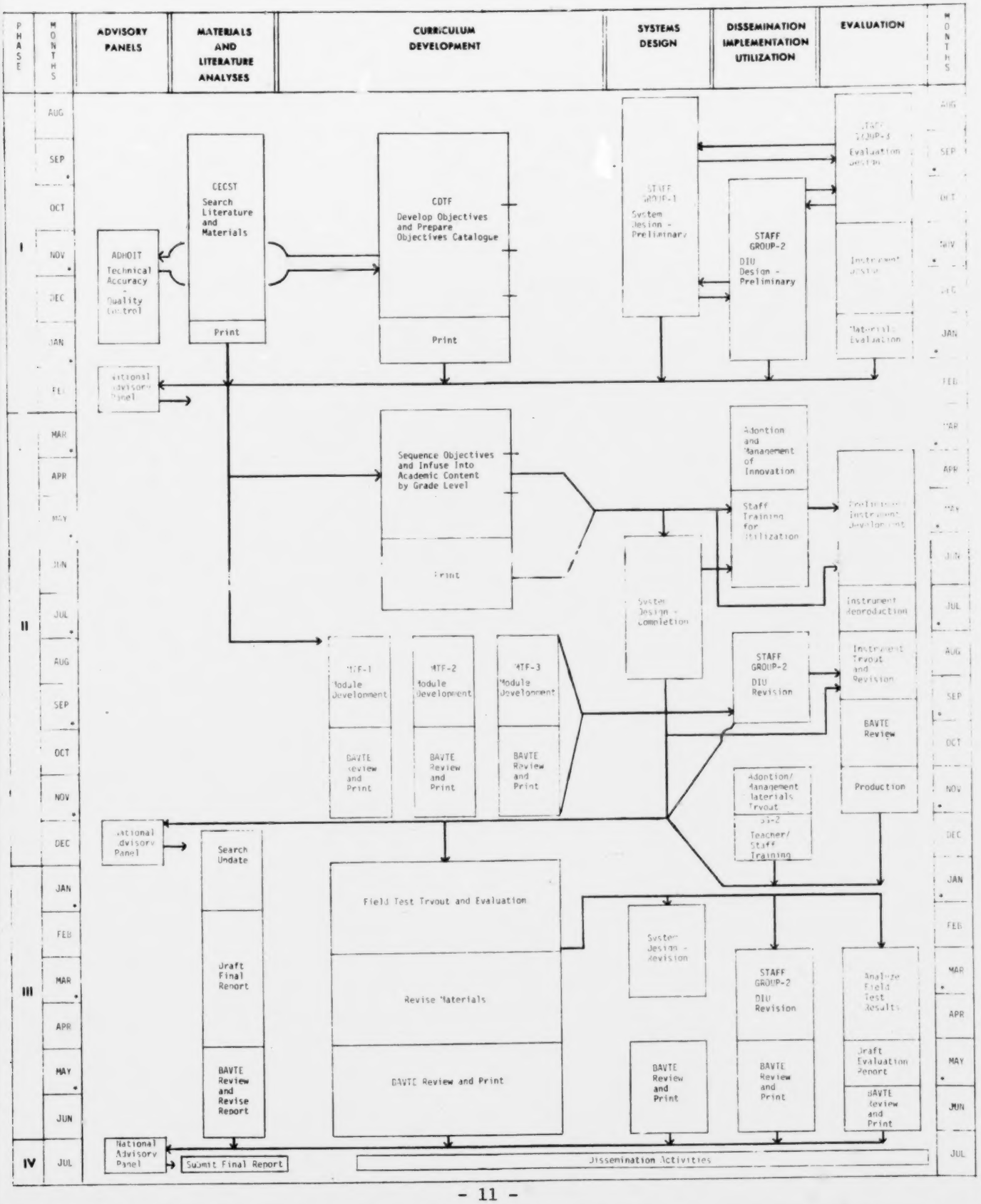
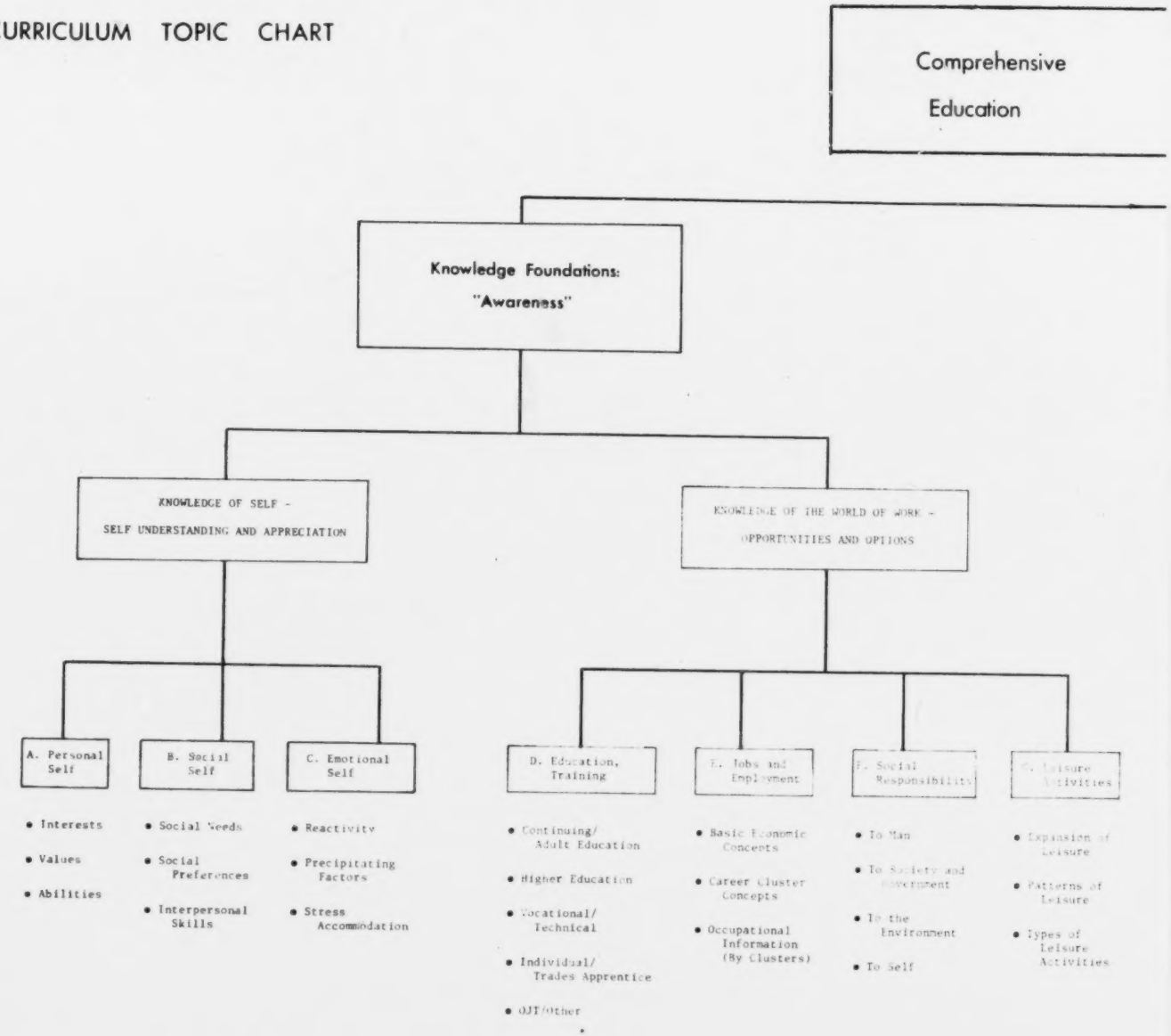
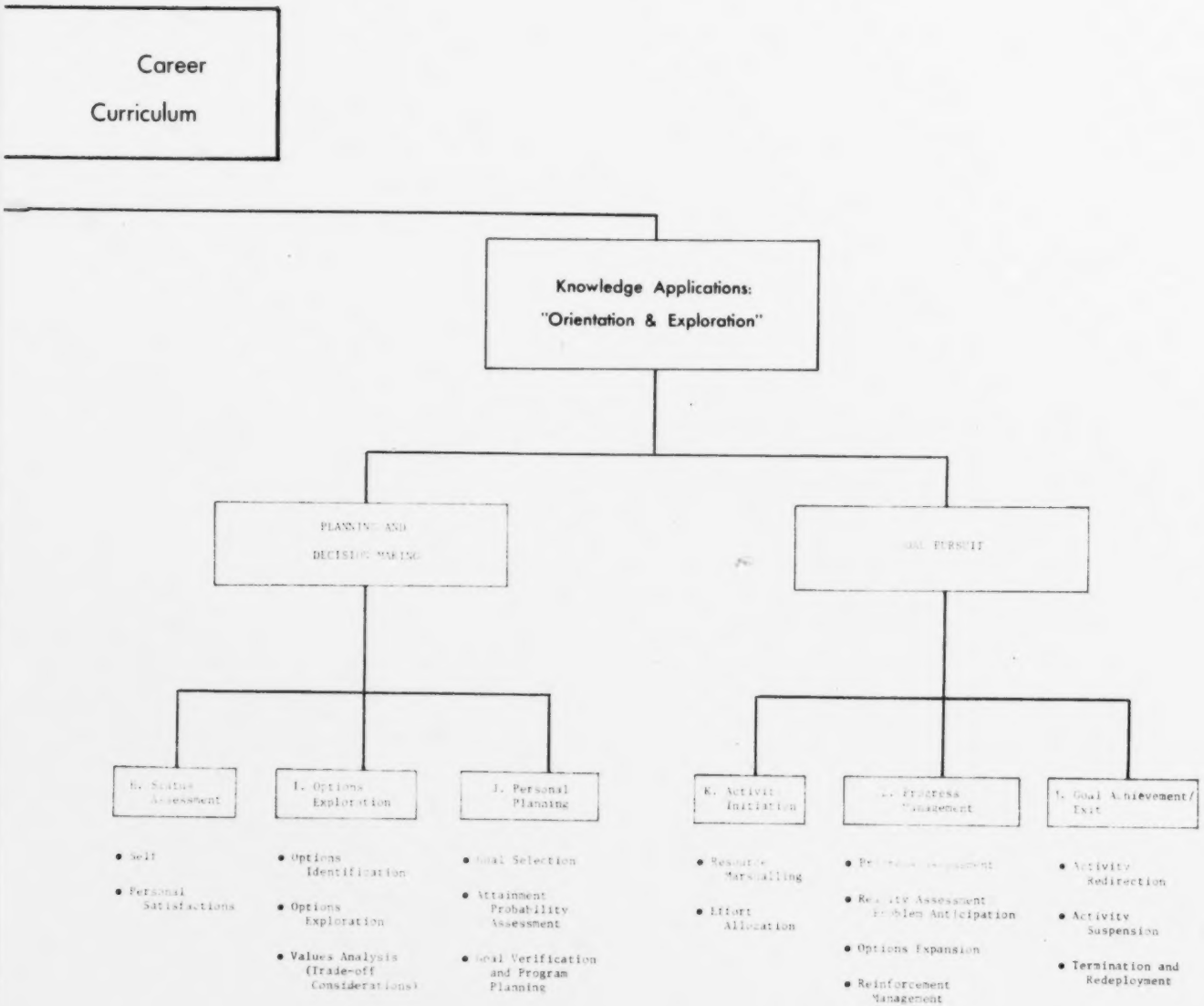

PHASE
MONTHS
ADVISORY PANELS
MATERIALS AND LITERATURE ANALYSES
CURRICULUM DEVELOPMENT
SYSTEMS DESIGN
DISSEMINATION IMPLEMENTATION UTILIZATION
EVALUATION
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
I
II
III
IV
CECST
Search Literature and Materials
Print
ADHOIT
Technical Accuracy - Quality Control
CDTF
Develop Objectives and Prepare Objectives Catalogue
Print
STAFF GROUP-1
System Design - Preliminary
STAFF GROUP-2
DIU Design - Preliminary
Material Evaluation
Sequence Objectives and Infuse Into Academic Content by Grade Level
Print
Adoption and Management of Innovation
Staff Training for Utilization
System Design - completion
Instrument Reproduction
MTF-1
Module Development
BAVTE Review and Print
MTF-2
Module Development
BAVTE Review and Print
MTF-3
Module Development
BAVTE Review and Print
STAFF GROUP-2
DIU Revision
Instrument Tryout and Revision
BAVTE Review
Production
Adoption/ Management Materials Tryout
Teacher/ Staff Training
Search Update
Draft Final Report
BAVTE Review and Revise Report
Field Test Tryout and Evaluation
Revise Materials
BAVTE Review and Print
System Design - Revision
BAVTE Review and Print
STAFF GROUP-2
DIU Revision
BAVTE Review and Print
Analyze Field Test Results
Draft Evaluation Report
BAVTE Review and Print
National Advisory Panel
Submit Final Report
Dissemination Activities

Figure 2

THE AIR CEC PROJECT

CURRICULUM TOPIC CHART




Career
Curriculum
Knowledge Applications:
"Orientation & Exploration"
PLANNING AND
DECISION MAKING
GOAL PURSUIT
H. Status
Assessment
I. Options
Exploration
J. Personal
Planning
K. Activity
Initiation
L. Progress
Management
M. Goal Achievement/
Exit
• Self
• Personal
Satisfactions
• Options
Identification
• Options
Exploration
• Values Analysis
(Trade-off
Considerations)
• Goal Selection
• Attainment
Probability
Assessment
• Goal Verification
and Program
Planning
• Resource
Marshalling
• Effort
Allocation
• Activity Assessment
• Options Expansion
• Reinforcement
Management
• Activity
Redirection
• Activity
Suspension
• Termination and
Redeployment

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C E C STRAND CONCEPT CHART

OPPORTUNITIES AND OPTIONS: JOBS AND EMPLOYMENT

TOPICS	K - 1	2 - 3	4 - 6	7 - 9
Basic Economic Concepts	none	1. types of productivity 2. monetary exchange system	3. labor market 4. factors affecting income 5. migration and mobility 6. monetary and non-monetary benefits 7. supply and demand	
Career Cluster Concepts	none	1. examples of clusters 2. practice in using clusters	3. how to form clusters 4. reasons for clustering 5. introduction to 12 career clusters	6. similarities and differences between 12 career clusters 7. comparison of jobs within 12 career clusters 8. rationale for 12 career clusters
Occupational Information, by Clusters				
12 Career Clusters:				
I. Engineering, Physical Science, Mathematics, and Architecture		CC I - 2 jobs	CC I - 6 jobs	none
II. Medical and Biological Sciences	CC II - 3 jobs		CC II - 5 jobs	
III. Business Administration	CC III - 1 job	CC III - 2 jobs	CC III - 4 jobs	
IV. General Teaching and Social Services	CC IV - 1 job	CC IV - 2 jobs	CC IV - 4 jobs	
V. Humanities, Law, Social and Behavioral Sciences		CC V - 1 job	CC V - 5 jobs	
VI. Fine Arts, Performing Arts		CC VI - 4 jobs	CC VI - 2 jobs	
VII. Technical Jobs		CC VII - 2 jobs	CC VII - 5 jobs	
VIII. Business, Sales		CC VIII - 1 job	CC VIII - 2 jobs	
IX. Mechanics, Industrial Trades		CC IX - 6 jobs	CC IX - 6 jobs	
X. Construction Trades		CC X - 8 jobs	CC X - 3 jobs	
XI. Business, Secretarial-Clerical	CC XI - 2 jobs	CC XI - 5 jobs	CC XI - 9 jobs	
XII. General, Community Service, Public Service	CC XII - 7 jobs	CC XII - 7 jobs	CC XII - 9 jobs	

Figure 3

C E C STRAND CONCEPT CHART

OPPORTUNITIES AND OPTIONS: SOCIAL RESPONSIBILITY

TOPICS	K - 1	2 - 3	4 - 6	7 - 9
To Man	1. respect for others	2. safety and health of others	3. consequences of own actions for others	4. value of helping others
To Society and Government	1. loyalty to friends and country	2. necessity of rules and laws 3. importance of compliance with rules and laws	4. volunteer service in community programs 5. obligation to protest unjust laws and rules 6. value of personal rights and freedoms	7. purpose of government 8. structure and function of federal, state, and local government 9. citizen participation in a democracy 10. interpretation of one person's rights [illegible] those of others 11. equal application of law to everyong, in all cases
To the Environment	1. enjoyment of nature	2. balance of nature	3. fragile character of ecological system when disturbed by man 4. implications of societal changes for the environment	5. importance and need for natural beauty 6. man's debt to future generations 7. effects of individual action
To Self and Family	1. health and safety of self	2. nutrition 3. neatness and grooming	4. self-protection: drug and sex education	5. value and dignity of the individual

Figure 4

C E C STRAND CONCEPT CHART

PLANNING AND DECISION MAKING: STATUS ASSESSMENT

TOPICS	K - 1	2 - 3	4 - 6	7 - 9
Self	none	1. assessment of physical abilities 2. assessment of general interests	3. assessment of cognitive abilities 4. consideration of information about personal characteristics (interests, etc.) as profiles of greater and lesser strengths 5. interpretation of simple test results in terms of average, above average, and below average 6. consideration of how interests change	7. analysis and definition of specific interests and abilities 8. assessment of values 9. assessment of social skills 10. exploration of ways to develop abilities 11. recognition of factors influencing interests and values 12. use of tests, experiences, and self-examination in determining interests and values and abilities 13. identification of critical interests, abilities, and values to consider in making goals/plans 14. development of criteria for evaluating options based on critical personal characteristics
Personal Satisfactions	none	1. identification of variety of roles a person can fulfill in life	2. identification of what a person does that is satisfying or not satisfying 3. identification of possible life roles 4. consideration of reasons for pursuing alternative life roles	5. consideration of what in particular is satisfying or not satisfying about specific situations 6. identification of factors which would contribute to a satisfying life 7. determination of perceived responsibilities in life 8. personal determination of desired life roles

Figure 5

C E C STRAND CONCEPT CHART

PLANNING AND DECISION MAKING: OPTIONS EXPLORATION

TOPICS	K - 1	2 - 3	4 - 6	7 - 9
Options Identification	none	1. relation of what people do to their interests and abilities	2. relation of specific options to specific interests/abilities/values 3. value of identifying/considering many options	4. ranking of considerations (interests, abilities, satisfactions, values, etc.) in terms of importance/desirability 5. relation of options to patterns of considerations 6. satisfaction of considerations through alternative avenues 7. consideration of combinations of avenues/options
Options Exploration	none	none	none	1. purposes of exploration 2. kinds of information to seek 3. methods of obtaining information 4. different sources yield different kinds of information 5. value of primary vs. secondary sources 6. factors biasing information obtained
Values Analysis	none	none	1. options have benefits (advantages) and costs (disadvantages) 2. different options have different implications for life satisfactions 3. options have consequences which may affect other options	4. relative cost/benefit analysis of options 5. weighing costs against probable benefits and availability of resources 6. analysis of short vs. long term costs/benefits 7. consideration of resource and opportunity costs 8. personal determination of criteria for evaluating options 9. resolution of conflict among options or their consequences

Figure 6

C E C STRAND CONCEPT CHART

PLANNING AND DECISION MAKING: PERSONAL PLANNING

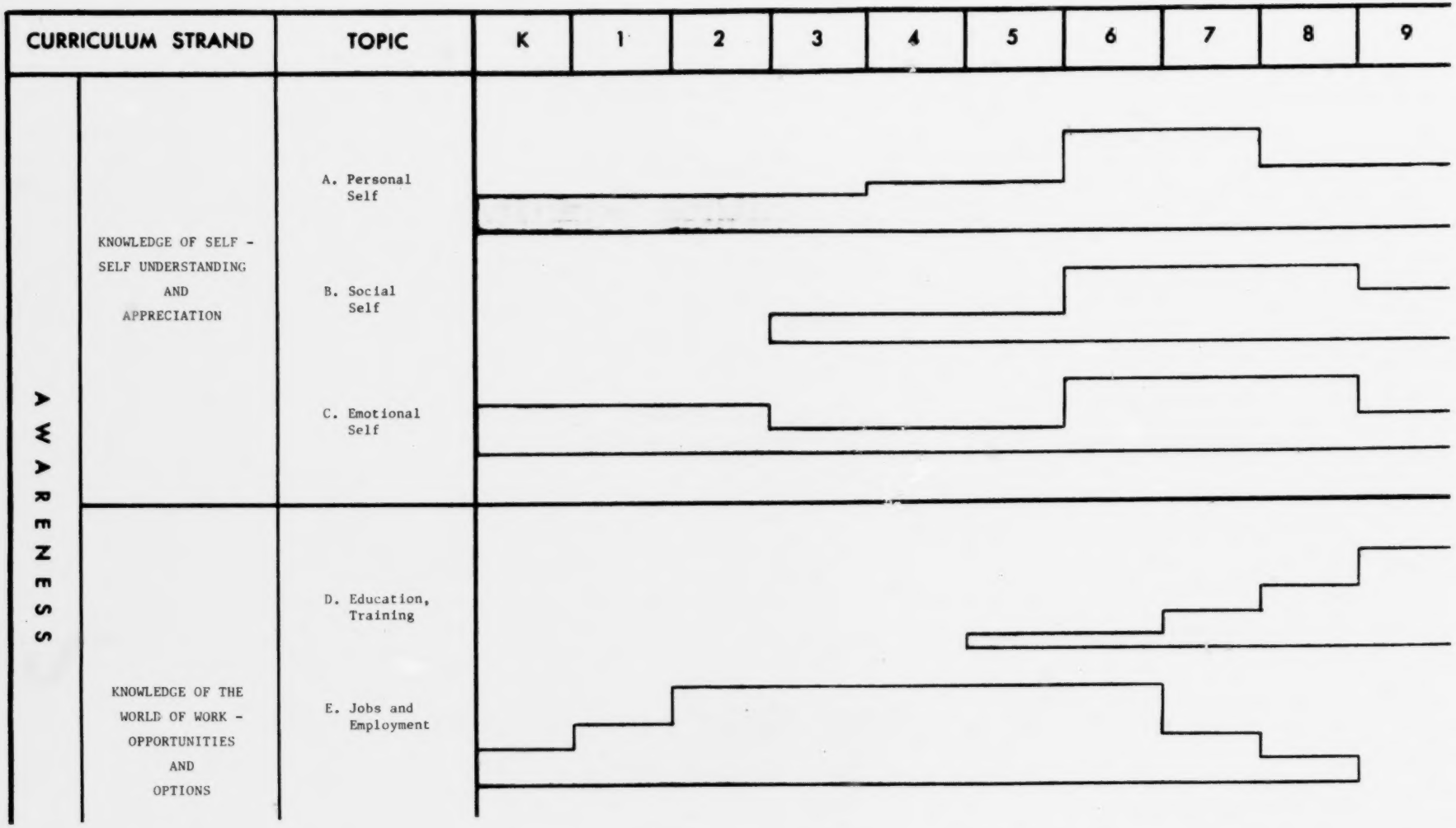
TOPICS	K - 1	2 - 3	4 - 6	7 - 9
Goal Selection	none	1. identification of general goals based on information about interests and abilities	2. relation of goal formulation to individual's agency 3. multiplicity of goals to consider (eg. occupational, educational, social, leisure) 4. identification of possible goals based on values and personal satisfactions as well as abilities and interests 5. examination of factors influencing changes in goals	6. value of data-based goal formulation 7. value of not locking in on specific goals too soon 8. weighting of data considered in goal formulation 9. selection of tentative goals compatible with personal characteristics 10. assessment of compatibility of different goals 11. resolution of conflict among tentative goals
Attainment Probability Assessment	none	1. identification of what people do in order to attain goals	2. identification of personal and situational factors influencing goal attainment 3. determination of general requisites for attaining given goal	4. identification of means to attain given goals 5. distinction between required means and facilitating means. 6. recognition of costs to attain goals 7. recognition of personal attributes necessary to attain given goals 8. realization of reasons for delay in attaining some goals 9. assessment of implications of means to attain goals for personal life 10. assessment of likelihood of attaining given goals
Goal Verification and Program Planning	none	none	1. identification of how a person can begin working toward goals while still in school	2. determination of which goals require immediate action and which do not 3. identification of critical decisions affecting goal attainment 4. determination of what specific actions will be required to attain given goals 5. preparation of plan(s) for accomplishing necessary tasks to attain goal(s)

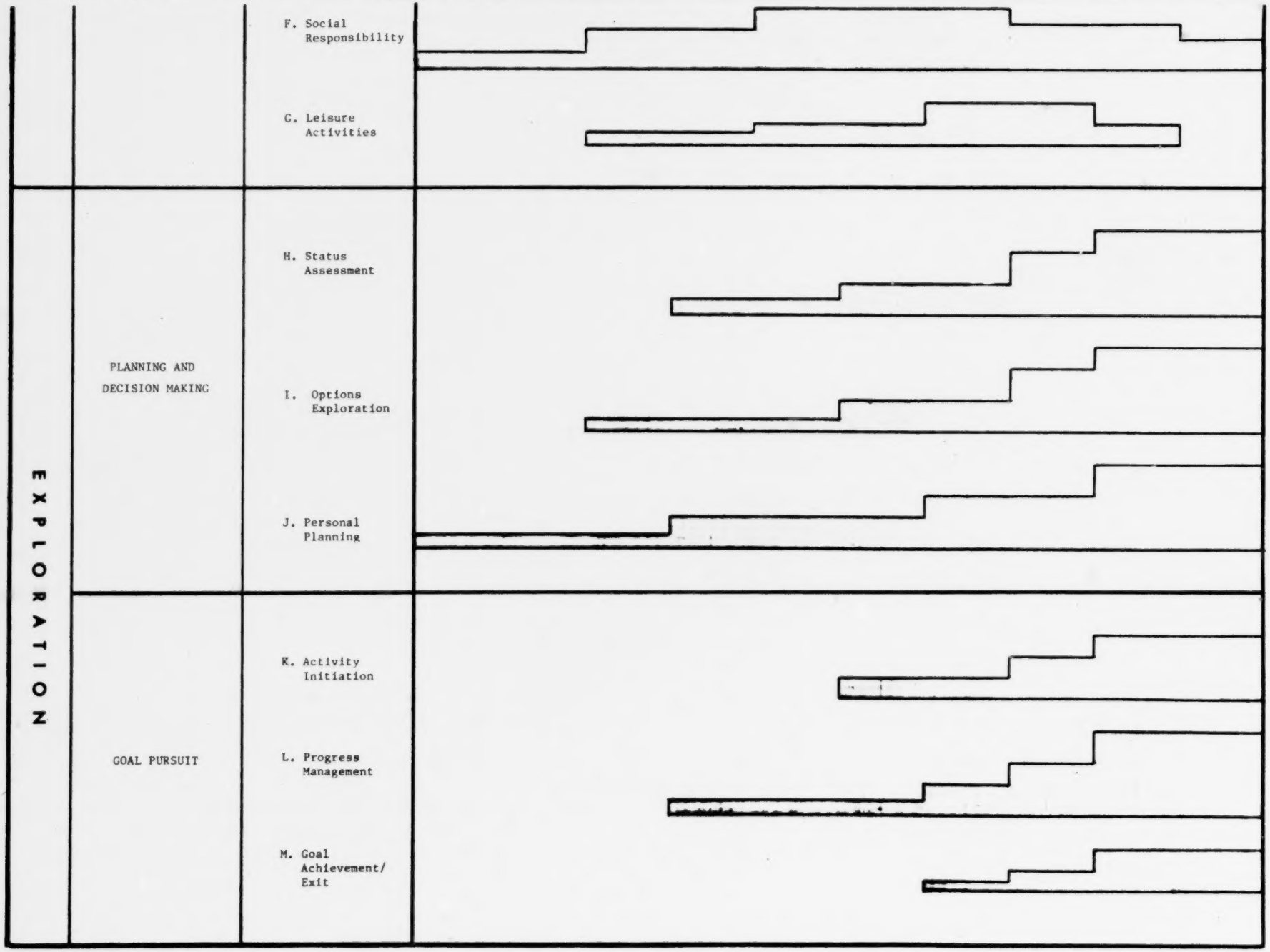
Figure 7

THE AIR CEC PROJECT

RELATIVE CONTENT COVERAGE BY GRADE LEVEL

Figure 8




EXPLORATION
PLANNING AND DECISION MAKING
GOAL PURSUIT
F. Social Responsibility
G. Leisure Activities
H. Status Assessment
I. Options Exploration
J. Personal Planning
K. Activity Initiation
L. Progress Management
M. Goal Achievement/ Exit

OCCUPATIONAL CLUSTERS AS USED IN THE AIR CEC PROJECT

Figure 9

TALENT CLUSTERS*			100 OCCUPATIONS**			
			In TALENT Cluster Analysis Base?			
Title	Description	Occupational Base	Yes	% Annual Openings	No	% Annual Openings
ENGINEERING, PHYSICAL SCIENCE, MATHEMATICS, ARCHITECTURE	Workers are involved in the research and application of the physical and mathematical sciences. Includes teaching, design, and development in areas concerned with inorganic matter, energy, physical measurement and relationships, production, and the like.	Mathematician Chemist Physicist Engineer Engineer, Civil & Hydraulic Engineer, Electrical & Electronic Engineer, Chemical Architect Teacher, High School Mathematics Teacher, High School Science Teacher, College & University Science	Mathematician Chemist Physicist Engineer, Civil Engineer, Electrical Architect	.2 .4 .4 .6 .6 .1	Meteorologist Engineer, Mechanical	.1 .4
MEDICAL AND BIOLOGICAL SCIENCES	Activities involved with living organisms and life processes. Provide services, explore problems, and research questions relating to all aspects of life, such as health and disease of all living things, including plants and animals.	Biologist[1] Physician Dentist Pharmacist Nurse	Doctor Dentist Pharmacist Nurse	1.0 .2 .2 3.2	Dietitian Physical Therapist	.1 .1
BUSINESS ADMINISTRATION	Includes occupations involved in the production, financial, and management aspects of commerce, banking, industry, and the military. Workers in this area typically determine policy, monitor progress, or provide other services which contribute to the on-going operation of an organization.	Financier[1] CPA Accountant Purchasing Agent Retail Store Buyer[1] Personnel Administrator Efficiency Expert, Industrial Engineer[1] Advertising Worker Business Manager[1] Manufacturing Manager[1] Marketing & Wholesale/Retail Trade Manager[1] Airplane Pilot Military Officer[1] Teacher, High School Commercial Education	Accountant Purchasing Agent Personnel Worker Pilot Advertising Worker	1.6 .3 .3 .1 .3	Marketing Research Worker Manufacturing Inspector	.1 1.0
GENERAL TEACHING AND SOCIAL SERVICE	Occupations in this group generally involve helping others through instruction, guidance, or in other ways facilitating the maintenance of people's social, physical, and intellectual well-being.	Social Worker Teacher Teacher, Elementary School Teacher, High School Teacher, High School Home Economics Teacher, High School Physical Education Teacher, Handicapped Clergyman	Social Worker Elementary School Teacher High School Teacher Home Economist Clergyman	.8 2.8 2.0 .4 .7	School Counselor	.2
HUMANITIES, LAW, SOCIAL AND BEHAVIORAL SCIENCES	Workers in this area are primarily interested in literature and philosophy, how human beings relate to one another, to the law, and to their social and economic environments.	Psychologist Teacher, High School Social Studies Teacher, High School English Teacher, High School Foreign Language Teacher, College & University Teacher, College & University Social Science Teacher, College & University English Lawyer	Psychologist College Professor Lawyer Librarian	.2 .8 .7 .4	Economist Newspaper Reporter	.1 .1

FINE ARTS, PERFORMING ARTS	Includes workers who are involved with the arts, such as the theater, music, painting, sculpting, crafts, or dancing.	Teacher, Art Teacher, Music Musician Theater Arts Worker	Singing Teacher, Singer Music Teacher, Musician Actor, Actress	.2 .4 <.1	TV & Radio Announcer Commercial Artist Dancer	<.1 .1 .1
TECHNICAL	Includes those workers who support physical and biological scientists. May be involved in design, development, production, maintenance, testing, or research. Most often work with equipment in laboratories, computer centers, design groups, or in other technical settings.	Programmer Laboratory Technician/Medical & Biological Sciences Laboratory Technician/Physical Sciences & Engineering[1] Medical Technologist Electronic Technician[1] Draftsman Photographer	Draftsman Medical Laboratory Assistant Computer Programmer Photographer & Photographic Laboratory Worker	.8 .6 1.1 .2	Sanitation Technician Surveyor Dental Hygienist	<.1 .1 .1
BUSINESS, SALES	Workers in this area make possible the transactions between manufacturers of products and customers who need and use those products through trade activities of various types. May be directly involved in selling or in the supervision of sellers.	Supervisor in Business Sales Clerk[1] Insurance Salesman Salesman Sales Manager Proprietor[1]	Salesman	12.4	Hotel/Motel Manager	.5
MECHANICS, INDUSTRIAL TRADES	Includes skilled craftsmen who use tools and instruments to build, operate, and maintain machines and other types of equipment.	Electrician Appliance Repairman Mechanic Auto Mechanic Airplane Mechanic Machinist Printing Tradesman Machine Tradesman	Electrician Appliance Repairman Auto Mechanic Compositor Pressman Related Press Activities Worker Airplane Mechanic Machinist TV & Radio Repairman	.5 .4 1.0 .2 .1 .1 .5 .6 .1	Telephone Repairman & Craftsman Welder	.3 1.1
CONSTRUCTION TRADES	Workers in this area are involved in all phases of building, repair, remodeling, or maintenance of buildings, bridges, roadways, or other structures.	Carpenter Plumber, Pipefitter Bricklayer, Mason Miscellaneous Building & Construction Tradesman	Carpenter Plumber Bricklayer Cement Mason Construction Laborer	2.0 1.0 .4 .2 1.4	Painter Plasterer Roofer Iron Worker Production Painter	1.2 .1 .1 .2 .2
BUSINESS, SECRETARIAL-CLERICAL	Assist business and industry with record keeping, communications, shipping and receiving merchandise, and operating equipment, such as office machines.	Bookkeeper Bank Clerk Miscellaneous Computing & Account Recording Worker Keypunch Operator[1] Computer Operator Secretary Legal Secretary Stenographer Typist Clerk Receptionist & Other Public Contact Workers Court Reporter[1] Miscellaneous Clerical Worker	Bookkeeper Bank Clerk/Teller Office Machine Operator Secretary Computer Operator	4.0 2.5 1.2 11.8 1.0	Telephone Operator Airline Stewardess Airline Ticket Clerk Shipping & Receiving Clerk Hotel Worker Cashier Postal Clerk Railroad Clerk	1.4 - .1 .6 .2 1.4 .7 .1
GENERAL, COMMUNITY SERVICE, PUBLIC SERVICE	Workers in this area provide services to people in the community, such as policing the streets, putting out fires, making food and clothing, assisting in health care, transporting goods, and providing personal services, such as beauty care.	Farm & Ranch Owner[1] Farmer, Gardener, Nurseryman[1] Policeman Fireman Military Serviceman[1] Practical Nurse Auto, Bus, Truck Driver Clothing & Fashion Tradesman[1] Hairdresser General Laborer[1]	Bus Driver Policeman Fireman Cosmetologist Truck Driver Taxi Driver Practical Nurse	.1 .7 .4 1.9 2.9 .1 2.4	Barber Mailman Gas Station Attendant Locomotive Engineer Chef, Cook Recreation Worker Waiter, Waitress Forest Ranger Assembly Line Worker Maid Railroad Brakeman	.6 .6 .5 .1 2.4 .2 1.3 .1 1.3 6.0 <.1

[a] Defined by similarity in the ability profiles of individuals entering these occupations

[aa] Accounting for 76.5% of the estimated job openings listed in the Occupational Outlook Quarterly, Spring, 1970; the 400 list accounts for 65.6% of all estimated annual job openings, 1968-1980, as projected by the Bureau of Labor Statistics.

[1] This occupation not one of the 100 occupations

- Estimate not available